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ARS 858 (2012) (English): Rough (paddy)
rice — Specification



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Rough (paddy) rice — Specification



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This African Standard was prepared by the ARSO Technical Harmonization Committee on Agriculture and Food Products (ARSO/THC 1).

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Introduction

Rice is the second most consumed cereal grain. It provides more than one fifth of the calories consumed worldwide by humans.

On the African continent, rice is grown in a wide range of climatic conditions, from river deltas to mountainous regions and mainly uses rainfed systems. Predicted demands for rice remain strong. An additional 116 million tons of rice will be needed by 2035 to feed growing populations. In Africa, where rice is the most rapidly growing food source, about 30 million tons more rice will be needed by 2035, representing an increase of 130% in rice consumption from 2010.

Grading is necessary in the development of quality standards that define the relationship between grades and prices in the assessment of the value of grains. Official standards are important in the marketing process because they furnish the means of describing variations in quality and condition. They also provide a basis for merchandising contracts, for quoting prices, for loans on product in storage and for sorting and blending by producers to meet market requirements. Grading then provides for an orderly marketing and trading system.

When grades and prices are defined, the farmers become virtually interested in producing better crops because with grading they are assured that their return are based on the quality of their produce.

Rough (paddy) rice — Specification

1 Scope

This African Standard specifies the requirements and methods of sampling and test for rough (paddy) rice of the varieties grown from *Oryza spp* used for further processing.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

AOAC Official Method 2001.04, *Determination of Fumonisin B₁ and B₂ in corn and corn flakes — Liquid chromatography with immunoaffinity column cleanup*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 605, *Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods*

ISO 711, *Cereals and cereal products — Determination of moisture content (Basic reference method)*

ISO 712, *Cereals and cereal products — Determination of moisture content — Routine reference method*

ISO 5223, *Test sieves for cereals*

ISO 5984, *Animal feeding stuffs — Determination of crude ash*

ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella spp.*

ISO 6639-1, *Cereals and pulses — Determination of hidden insect infestation — Part 1: General principles*

ISO 6639-2, *Cereals and pulses — Determination of hidden insect infestation — Part 2: Sampling*

ISO 6639-3, *Cereals and pulses — Determination of hidden insect infestation — Part 3: Reference method*

ISO 6639-4, *Cereals and pulses — Determination of hidden insect infestation — Part 4: Rapid methods*

ISO 6888-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 1: Technique using Baird-Parker agar medium*

ISO 6888-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 2: Technique using rabbit plasma fibrinogen agar medium*

ISO 6888-3, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 3: Detection and MPN technique for low numbers*

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 13690, *Cereals, pulses and milled products — Sampling of static batches*

ISO 16050, *Foodstuffs — Determination of aflatoxin B₁, and the total content of aflatoxin B₁, B₂, G₁ and G₂ in cereals, nuts and derived products — High performance liquid chromatographic method*

ISO 20483, *Cereals and pulses — Determination of the nitrogen content and calculation of the crude protein content — Kjeldahl method*

ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0.95*

3 Definitions

For the purpose of this standard the following definitions apply.

3.1

paddy

paddy rice

rough rice

whole or broken kernels of paddy rice from (*Oryza glaberrima*, *Oryza sativa*, *Oryza longistaminata*) retaining its husk after threshing

3.2

husked rice

brown rice

cargo rice

paddy from which the husk only has been removed

NOTE The processes of husking and handling may result in some loss of bran.

3.3

milled rice

white rice

husked rice from which almost all of the bran and embryo (germ) have been removed by milling

3.3.1

undermilled rice

milled rice obtained by milling husked rice, but not to the degree necessary to meet the requirements of well-milled rice

3.3.2

well-milled rice

milled rice obtained by milling husked rice in such a way that most of the bran and part of the embryo have been removed

3.3.3

extra-well-milled rice

milled rice obtained by milling husked rice in such a way that almost all of the bran and the embryo have been removed

3.4

parboiled rice

husked or milled rice processed from paddy or husked rice that has been soaked in water and subjected to a heat treatment so that the starch is fully gelatinized, followed by a drying process

3.5**waxy rice**

glutinous rice

varieties of rice whose kernels have a white and opaque appearance

NOTE The starch of waxy rice consists almost entirely of amylopectin. The kernels have a tendency to stick together after cooking.

3.6**whole kernel**

husked or milled kernel without any broken part, or part of kernel with a length greater than or equal to nine-tenths of the average length of the test sample kernels

NOTE See Figure 1.

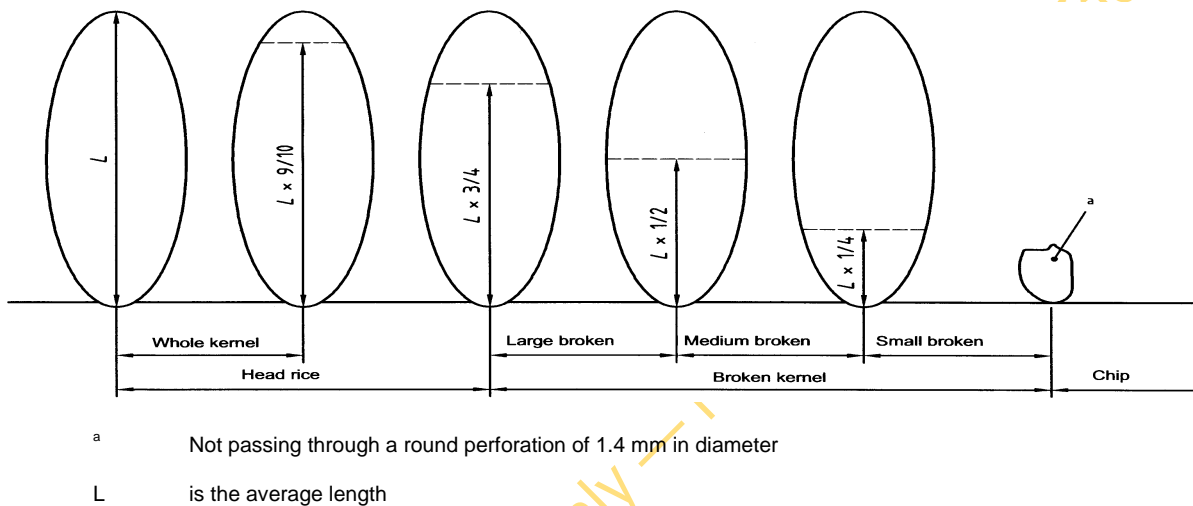


Figure 1 — Size of kernels, broken kernels and chips

3.7**head rice**

whole kernel or part of kernel with a length greater than or equal to three-quarters of the average length of the test sample kernels

NOTE See Figure 1.

3.8**large broken kernel**

part of kernel with a length less than three-quarters but greater than one-half of the average length of the test sample kernels

NOTE See Figure 1.

3.9**medium broken kernel**

part of kernel with a length less than or equal to one-half but greater than one-quarter of the average length of the test sample kernels

NOTE See Figure 1.

3.10**small broken kernel**

part of kernel with a length less than or equal to one-quarter of the average length of the test sample kernels but which does not pass through test sieve with round apertures having diameter 1.4 mm

NOTE See Figure 1.

3.11

chip

part of kernel which passes through a test sieve complying with ISO 5223, and with round apertures having diameter 1.4 mm

3.12

average length, *L*

arithmetic mean of the length of the test sample kernels that are not immature or malformed and without any broken parts

3.13

extraneous matter

inorganic and organic components other than whole or broken kernels of rice

3.13.1

inorganic extraneous matter

inorganic components, such as stone, sand and dust

3.13.2

organic extraneous matter

extraneous matter including edible and non-edible

3.13.2.1

edible organic extraneous matter

extraneous matter, such as bran, non-toxic foreign seeds, flour lumps, and other food

3.13.2.2

non-edible organic extraneous matter

extraneous matter, including husks, pieces of straw, and impurities of animal origin, such as dead insects and their fragments

3.14

heat-damaged kernel

head rice or broken kernel that has changed its normal colour as a result of microbiological heating

NOTE This category includes kernel that is yellow to dark yellow in the case of non-parboiled rice and orange to dark orange in the case of parboiled rice, due to a microbiological alteration.

3.15

damaged kernel

head rice or broken kernel showing evident deterioration due to moisture, pests, disease or other causes, but excluding heat-damaged kernels

3.15.1

spotted kernel

whole or broken kernel showing a well defined small circle of dark colour or more or less regular shape

3.15.2

stained kernel

whole or broken kernel which has undergone on a small area of its surface an obvious change in its natural colour. The stains maybe of different colours e.g., blackish, reddish and brown. Deep black striations are also considered stains.

3.15.3

pecks

head rice or broken kernel of parboiled rice of which more than one-quarter of the surface is dark brown or black in colour due to the parboiling process

3.15.4

immature kernel

a whole or broken kernel which is undeveloped

3.15.5**shrivel kernel**

a kernel which has become shrunken and wrinkled from great heat or lack of moisture

3.15.6**black kernel**

a kernel showing a distinctly dark colouration

3.15.7**over-dried damaged**

refers to defective grains caused by overheating during artificial drying. It can be detected where grain is hot, exhibits an unusual odour, exhibits significant sprouting (greater than 10%) or other evidence of weather damage

3.15.8**smutty rough rice**

rough rice which contains more than 3.0 percent of smutty kernels

3.16**immature kernel****malformed kernel**

head rice or broken kernel which is unripe or badly developed

3.17**chalky kernel**

head rice or broken kernel of non-parboiled rice, except waxy rice, whose whole surface has an opaque and floury appearance

3.18**red kernel**

head rice or broken kernel having a red bran covering more than one-quarter of its surface

3.19**red-streaked kernel**

head rice or broken kernel with red bran streaks of length greater than or equal to one-half of the average length, but where the surface covered by these red streaks is less than one-quarter of the total surface

3.20**partly gelatinized kernel**

ungelatinized kernels

non-gelatinized kernels

head rice or broken kernel of parboiled rice which is not fully gelatinized and shows a distinct white opaque area

3.21**milling yield**

an estimate of the quantity of whole kernels and total milled rice (whole and broken kernels combined) that are produced in the milling of rough rice to a well-milled degree

3.22**parboiled rough rice**

rough rice in which the starch has been gelatinized by soaking, steaming, and drying. If the rice is:

- (1) Not distinctly coloured by the parboiling process, it is considered "Parboiled Light";
- (2) distinctly but not materially coloured by the parboiling process, it is considered "Parboiled";
- (3) materially coloured by the parboiling process, it is considered "Parboiled Dark."

3.23

poisonous, toxic and/or harmful seeds

any seed which if present in quantities above permissible limit may have damaging or dangerous effect on health, organoleptic properties or technological performance such as Jimson weed — dhatura (*D. fastuosa* Linn and *D. stramonium* Linn.) corn cokle (*Agrostemma githago* L., *Machai Lallium remulenum* Linn.) Akra (*Vicia* species), *Argemone mexicana*, Khesari and other seeds that are commonly recognized as harmful to health

3.24

enriched rice

forms of milled rice to which nutrients or enriching substances have been added

3.25

green/immature kernel

a whole or broken kernel, which is undeveloped and may be green in colour.

3.25.1

yellow kernel

a whole kernel, which has undergone, totally or partially, through heating or other causes, a change in its natural colour and has taken a lemon or orange-yellow tone

3.25.2

amber kernel

a whole kernel, which has undergone thorough heating or other causes, a slight uniform change in colour over the whole surface; this change alters the colour of the kernel to a slight amber-yellow

4 Quality requirements

4.1 Classification

Rice shall be classified as follows:

4.1.1 Long grain rice — Rice with 80% or more of kernels after milling to a well-milled degree, having a length of at least 6.67 mm and a length/width ratio of over 3.0.

4.1.2 Medium grain rice — Rice with 80% or more of kernels after milling to a well-milled degree, having a length of 6.20 to 6.66 mm and a length/width ratio between 2.0 and 3.0.

4.1.3 Short grain rice — Rice with 80% or more of kernels after milling to a well-milled degree, having a length of less than 6.20 mm and a length/width ratio of less than 2.0.

4.2 General requirements

4.2.1 Rough rice shall meet the following general requirements/limits as determined using the relevant standards listed in Clause 2. Rough rice

- a) shall be the dried mature grains of edible *Oryza spp*;
- b) be clean, wholesome, uniform in size, colour and shape;
- c) shall be safe and suitable for human consumption;
- d) shall be free from abnormal flavours, musty, sour or other undesirable odour, obnoxious smell and discolouration;
- e) shall be free from micro-organisms and substances originating from micro-organisms, fungi or other poisonous or deleterious substances in amounts that may constitute a hazard to human health.
- f) shall be free of living insects.

4.2.2 Rough rice shall be in form of well-filled seeds of uniform colour representative of the declared variety.

4.3 Specific requirements

4.3.1 Grading

Rough rice may be graded into three grades on the basis of the tolerable limits established in Table 1 which shall be additional to the general requirements set out in this standard.

4.3.2 Ungraded rough rice

Ungraded rough rice shall be rough rice which does not fall within the requirements of Grades 1, 2 and 3 of this standard but meet the minimum requirements provided in 4.2 and are not rejected rough rice. Ungraded rough rice can be sorted out to Grade 1, 2 or 3 in accordance with the relevant grading procedure.

4.3.3 Reject grade rough rice

This comprises rough rice which has objectionable odour, off flavour, living insects or which do not possess the quality characteristics specified in Table 1. It cannot satisfy the conditions of ungraded rough rice and shall be graded as reject rough rice and shall be regarded as unfit for human consumption.

Table 1 — Specific requirements

| Characteristics | | Maximum limits | | | Method of test |
|--|-----------|----------------|---------|---------|---------------------|
| | | Grade 1 | Grade 2 | Grade 3 | |
| Purity, %m/m | | 98 | 95 | 95 | ISO 605 |
| Foreign matter, % m/m | Organic | 1.0 | 1.5 | 2.0 | |
| | Inorganic | 0.25 | 0.25 | 0.5 | |
| Pest damaged grains, % m/m, max | | 0.5 | 0.75 | 1.0 | |
| Discoloured grains, % m/m, max | | 0.5 | 2.0 | 4.0 | |
| Moisture, % m/m, max | | 14.0 | 14.0 | 14.0 | ISO 711; ISO 712 |
| Immature/shrivelled grains, % m/m | | 1.0 | 3.0 | 5.0 | ISO 605 |
| Ungelatinized/chalky kernels, % m/m | | 2.0 | 3.0 | 5.0 | |
| Nonparboiled, % m/m | | 0.1 | 0.1 | 0.2 | |
| Damaged kernels, % m/m | | 0.25 | 1.0 | 3.0 | |
| Heat damaged kernels, % m/m | | 0.1 | 0.2 | 0.6 | |
| Contrasting types, % m/m | | 3.0 | 6.0 | 10 | |
| Red kernels (Max %) | | 1.0 | 3.0 | 5.0 | |
| Total aflatoxin (AFB ₁ +AFB ₂ +AFG ₁ +AFG ₂)), ppb, max | | 10 | | | ISO 16050 |
| Aflatoxin B ₁ only, ppb, max | | 5 | | | |
| Fumonisin, ppm, max | | 2 | | | AOAC 2001.04 |

NOTE Broken % in brown and milled rice to be used to evaluate the paddy grades.

5 Contaminants

5.1 Heavy metals

Rough rice shall comply with those maximum limits for heavy metals established by the Codex Alimentarius Commission for this commodity.

5.2 Pesticide residues

Rough rice shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

5.3 Mycotoxin limits

Rough rice shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity. In particular, total aflatoxin levels in rough rice for human consumption shall not exceed 10 µg/kg (ppb) with B₁ not exceeding 5 µg/kg (ppb) when tested according to ISO 16050.

6 Hygiene

6.1 Rough rice shall be produced, prepared and handled in accordance with the provisions of appropriate sections of ARS 53.

6.2 When tested by appropriate standards of sampling and examination listed in Clause 2, the products:

- shall be free from microorganisms in amounts which may represent a hazard to health and shall not exceed the limits stipulated in Table 2;
- shall be free from parasites which may represent a hazard to health; and
- shall not contain any substance originating from microorganisms in amounts which may represent a hazard to health.

Table 2 — Microbiological limits

| | Type of micro-organism | Limits | Test method |
|------|-----------------------------------|-----------------|-------------|
| i) | Yeasts and moulds, max. per g | 10 ⁴ | ISO 21527-2 |
| ii) | <i>S. aureus</i> per 25 g | Not detectable | ISO 6888 |
| iii) | <i>E. Coli</i> , max. per g | Not detectable | ISO 7251 |
| iv) | <i>Salmonella</i> , max. per 25 g | Not detectable | ISO 6579 |

7 Packaging

7.1 Rough rice shall be packed in suitable packages which shall be clean, sound, free from insect, fungal infestation and the packing material shall be of food grade quality.

7.2 Rough rice shall be packed in containers which will safeguard the hygienic, nutritional, technological and organoleptic qualities of the products.

7.3 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odour or flavour to the product.

7.4 Each package shall contain rice of the same type and of the same grade designation.

7.5 If rough rice is presented in bags, the bags shall also be free of pests and contaminants.

7.6 Each package shall be securely closed and sealed.

8 Labelling

8.1 In addition to the requirements in ARS 56, each package shall be legibly and indelibly marked with the following:

- i) product name as “Rough/Paddy Rice”;
- ii) class;
 - o Long grain rough rice
 - o Medium grain rough rice
 - o Short grain rough rice
 - o Mixed rough rice
- iii) grade;
- iv) name, address and physical location of the producer/ packer/importer;
- v) lot/batch/code number;
- vi) net weight, in kg;
- vii) the declaration “Food for Human Consumption”
- viii) storage instruction as “Store in a cool dry place away from any contaminants”;
- ix) crop year;
- x) packing date;
- xi) instructions on disposal of used package;
- xii) country of origin;
- xiii) a declaration on whether the rough rice was genetically modified or not.

9 Sampling methods

Sampling shall be done in accordance with the ISO 13690.

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